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ABSTRACT

The primary purpose of this paper is to present evidence of significant differences in the effectiveness of schools serving low-income children; a secondary purpose is to show that one reason why more learning takes place in some classrooms and schools than in others has to do with differences in the effectiveness of teachers due to teaching experience and "vintage effects." Three samples of black second and third graders in New Haven were tested in reading and math at the beginning and end of the school year. Significant differences were found in the amount of learning taking place in different schools and different classrooms, even after taking into account the skill levels and family background each child brought to school. Findings also showed that, in all three samples, teachers with 3 to 5 years experience were more effective than teachers with less experience. Additional experience beyond the 5 years, however, did not increase effectiveness but reduced it slightly. Further investigation of the topic in a large midwestern city showed this apparent decline to be a research artifact produced by "vintage effects" (i.e., having to do with the lower quality of teacher hired at times of increasing enrollment and the higher quality of those hired at times of declining enrollment. (CMG)

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# INNER-CITY SCHOOLS CAN MAKE A DIFFERENCE

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The primary purpose of this paper is to present evidence of significant differences in the effectiveness of schools serving low-income children. These differences are large and demonstrate that even for poor children living in big cities and starting school without many of the advantages of their more affluent peers, school experiences do make a difference.

A secondary goal of the paper is to indicate one reason why more learning takes place in some classrooms and schools than in others. This reason concerns differences in the effectiveness of teachers due to teaching experience and "vintage effects." The second part of the paper explains these phenomena, demonstrates that they are related to teaching performance, and suggests implications for policy.

## Some schools and classrooms are particularly effective

To talk to professional educators about evidence that schools make a difference is a little like bringing ice to the Eskimos. Surely, one of the motivations that led each of you to choose education as a career is the belief that the quality of formal education children receive has a significant impact on their lives and that dedicated work by talented educators can make a difference.

It is important to remember, however, that this view has come under significant challenge in recent years. Central to this challenge is that we have not found widely applicable answers to the question of how to provide all American children with the cognitive and affective skills needed to function effectively in our society. Looking back from 1980 with the perspective of 15 years of extensive experimentation and efforts to find universally applicable solutions to the

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education problem, it seems surprising that we ever thought the problem would be easy to solve or that there could be universal solutions. However, one need only read the publicity that surrounded the passage of the Elementary and Secondary Education Act of 1965 to understand the optimism present at that time. Many observers thought that the funds provided by Title I of that act would permit schools to develop powerful programs that would effectively compensate for the disadvantages children from poor families often bring with them to school. Research strategies were designed to identify the most successful of these programs and intensive efforts were made to export these successful programs to other communities.

Fifteen years later we know that there are indeed successful school programs. However, we also know that it is extremely difficult to replicate these successes in other communities, in different schools within the same community, or even in successive years in the school in which the success was originally identified.

Given these frustrations, some observers have concluded that differences in the skill levels of children are due solely to differences in family backgrounds and other forces external to the school. They reason that schools seem successful at particular points in time only because they serve children who bring to school with them high levels of motivation and skills.

This view is challenged by the research I would now like to describe. This research shows clearly that there are large and important differences in the quality of education provided to children attending inner-city schools. This evidence provides clear support for the view that schools matter and that it is worthwhile to pursue the difficult task of making schools effective in providing children with the skills needed to lead productive lives.

The data base for the research described in this part of the paper consists of information on three samples of Black children who were students in the second or third grade in one of 15 inner-city elementary schools in New Haven, Connecticut, during the period 1970-1972. Each sample consisted of more than 400 children who spent the school year in one of 40 self-contained classrooms. The information available for each child included variables describing the child's background and test scores from two standardized tests of reading and mathematics. One test was administered at the beginning of the school year (or at the end of the previous school year) and the other at the end of the school year.

The strategy used was to investigate the following basic questions: If one wants to predict a child's achievement at the end of a school year and one already knows the child's skill level at the beginning of the school year and information about the child's family background, is it important to identify the school in which the child spent the school year? Is it also important to identify the classroom within the school? The alternative hypotheses are that approximately the same amount of learning took place in each of the 15 inner-city schools in the sample and in the 40 second- and third-grade classrooms within these schools. In this case, there might be differences in the average achievement levels of the children attending different schools, but these differences could be explained by the information on the children's family background and by the skill levels that the children brought with them to school at the beginning of the school year.

The results of the statistical analyses conducted to test these hypotheses provide clear evidence that there were significant differences in the amount of learning taking place in different schools and in different classrooms, even after taking into account the skill levels and family background that each child brought to school. These differences were statistically significant for all three samples and for skill levels in reading and mathematics. In other words, children with similar backgrounds *and* similar skill levels at the beginning of the school year were *not* similar in how much they learned during the school year: their learning depended significantly on *which* school they attended and, within any school, on which classroom they were assigned to. Something about those schools and classrooms had significant effects on the children.[1]

The next question to consider is, How large were the differences in the progress of students in different schools and in different classrooms? To address this question, it is useful to examine one of the three samples in detail. (The pattern of results for all three samples is essentially the same.) The average reading level of the children in the second-grade sample, expressed in grade equivalents, was 1.7 at the beginning of the second grade. In other words, the average skill level was equal to that achieved by the average child nationally at the end of the seventh month of the first grade. On average, the children in the second grade sample made seven months of progress

[1]See Murnane (1975) for a complete technical description of this research.

(again, measured in grade equivalents) between the months of October and May of the year they were in the second grade. There were, however, important differences in the average progress of children attending different schools. The largest average gain among the 15 schools was 12 months, while the lowest gain was only 6 months. It is important to remember that these differences existed *after taking into account* differences in the skill levels that children brought to school. Thus, there is significant evidence that, even among a sample of urban schools serving primarily poor children, there were important differences in their effectiveness in teaching children to read.

This research also revealed large differences in the amount of learning taking place among second-grade classrooms in the same school. For example, in one school with three second-grade classrooms, the average progress made by the children in one classroom was an 11-month gain, in a second classroom the average gain was 9 months, and in a third classroom the average gain was 4 months.[2] This was the widest spread observed among the 15 schools. However, the differences in the effectiveness of classrooms within many of the schools was sufficient to provide clear statistical evidence that it does not only matter which school a child attended, it also matters which classroom within the school the child spent the school year in.

This evidence is important because it demonstrates that research designed to explain why some children learn more in school than other children do must focus not only on school variables, such as the quality of leadership provided by the principal. One must also explore why different amounts of learning take place in different classrooms within the same school. My research on this issue has focused on differences in the effectiveness of classroom teachers. I now turn to this topic.

## Teachers matter

There is a great deal of quantitative evidence that teachers make a difference. Virtually every study of school effectiveness finds that

[2]The principal of each school was interviewed to learn, among other things, whether the large differences in learning taking place in different classrooms could be explained by grouping patterns. The 15 principals stated that this was not the case in their schools. Exceptional children were not put in a single classroom in these schools.

some attributes of teachers are significantly related to student achievement. This section of the paper discusses two factors I have found to be related to teaching effectiveness, namely teacher experience, and what I call "vintage effects."

### *Teacher experience*

The hypothesis that teachers become more effective as they gain experience rests on the view that teaching is a complex process requiring a varied set of skills, many of which can only be learned on the job. In other words, teachers learn to teach by teaching, and, as a result, they become more effective as they acquire experience.

I found strong support for this hypothesis in my research in New Haven. In all three samples, teachers with three to five years of experience were more effective than teachers with less experience. For example, students in classes taught by teachers with three to five years of experience made two to three months more progress (measured in grade equivalents) in acquiring reading skills during the school year than students taught by first-year teachers. The differences in children's progress in acquiring mathematics skills were even larger.

The implications of these findings for policymaking depend to a great extent on the opportunities and constraints that individual school districts and administrators face. However, there are two general, if obvious, implications. The first is that most first-year teachers need a great deal of help and encouragement and that it is very important for them and their students that support be readily available in a nonthreatening form. The second implication is that great care should be taken to assure that the same children are not assigned to first-year teachers for several years in a row.

My research in New Haven did not find that teachers became more effective as they acquired additional experience after the initial three to five years of teaching. In fact, there is weak evidence that teachers with more experience were slightly less effective. This could be due to the much publicized phenomenon of teacher burnout. Another partial explanation may be that very experienced teachers make contributions to school effectiveness not reflected in the achievement test score gains of their own students. For example, they may help beginning teachers by providing them with instructional materials and advice on how to deal with difficult children. A

third explanation is that the apparent decline in the effectiveness of teachers after they acquire three to five years of experience is a research artifact produced by vintage effects.

### *Vintage effects*

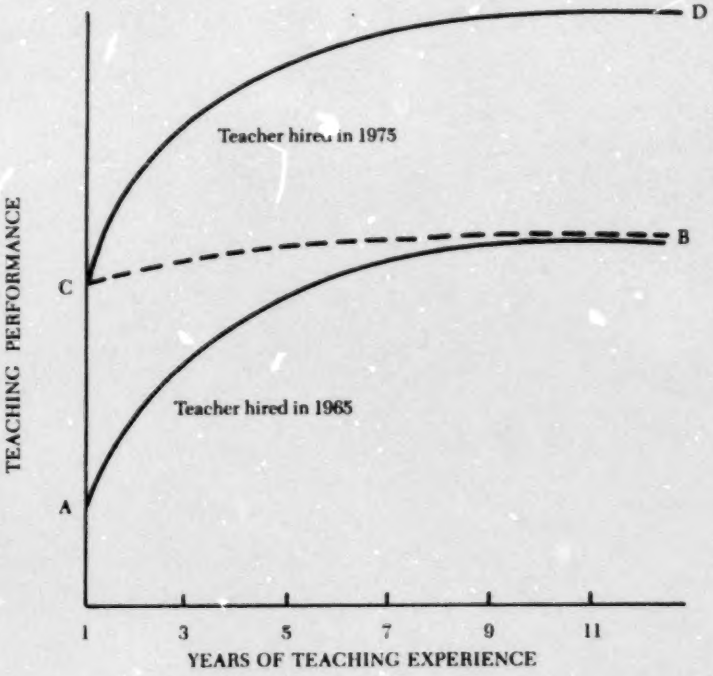
Vintage effects are defined as differences in the average abilities of teachers hired by school districts at different points in time. The most compelling explanation for the existence of vintage effects is that dramatic changes in labor market conditions for teachers over the last 25 years have affected the quality of new entrants to the teaching profession. In the late 1950's and early 1960's, a rapid increase in student enrollments created an acute shortage of teachers in the United States. Many school districts, particularly urban districts, found it difficult to find minimally qualified applicants to fill vacant positions. By 1970 this situation had changed significantly. Due to the combination of a decrease in the demand for teachers precipitated by declining enrollments and an increase in the supply of teachers (a delayed response to the earlier shortage), there has been a surplus of teachers in most subject areas during the 1970's. As a result, school districts have been able to be very selective in choosing among the large number of applicants for teaching positions. Assuming that district personnel officers are able to identify applicants with the greatest potential, the average quality of new teachers should be higher in periods of excess supply, such as the 1970's, than in periods of excess demand, such as the early 1960's.

Vintage effects are of interest for two reasons. First, the idea that labor market conditions for teachers influence the ability of school districts to find high quality teachers has implications for hiring policies in the future. These implications are discussed in the next section. The second reason for interest in vintage effects is that they influence the observed relationship between teaching experience and teaching performance. This influence is a result of the research strategy used to investigate the experience-performance relationship.

The most straightforward way to investigate the impact of teaching experience on teaching performance is to examine the effectiveness of individual teachers over time. To date this strategy has not been used. Instead, the role of experience has been investigated by estimating the relationship between experience and performance in a cross section of teachers. In other words, data on teachers and stu-

dents are collected at one point in time, and the effectiveness of teachers who have different levels of experience at that time is analyzed. The implicit assumption underlying this strategy is that, after controlling for the effects of observable variables such as background and training, all the teachers are of equal ability except for differences due to experience. However, there may also be differences in ability due to vintage effects that will create bias in the estimated relationship between teaching experience and teaching performance.

An example may help to clarify this argument. Assume that all teachers do become more effective as they gain experience, and the biggest performance gains come in the initial years of teaching. This is illustrated by curves AB and CD in the figure below, both of which show the improvement in the performance of representative teachers as the teachers gain experience.



The effects of vintage are shown by the vertical distance between the two curves AB and CD. At any given level of experience the teacher hired in 1975 is more effective than the teacher hired in 1965. This difference reflects the fact that school districts could be more selective in choosing among applicants in 1975 than they could in 1965. When the relationship between teaching experience and teaching performance is estimated by comparing the effectiveness of teachers who have 1 and 11 years of experience at the end of 1975, it is the dashed line CB that is estimated. Thus, if vintage effects exist, it is possible to find no relationship between teaching experience and teaching performance in a cross section of teachers even if every teacher improves with experience.

The next step in my research was to examine just how important vintage effects were, both in determining teaching effectiveness and in influencing the experience-performance relationship. The basic research strategy was to estimate, in the context of a single statistical model, the effects on teaching performance of both vintage and experience. In terms of the figure on page 37, the goal was to estimate the size of the vertical distance AC, the vintage effect, and the changing slope of either AB or CD, the experience effect.

The variable used to indicate vintage effects was the change in total student enrollments in the district between the year in which a teacher first taught in the district and the previous year. The logic underlying the use of this variable was that, in years of rapidly growing student enrollments, this district and neighboring districts competing for teachers in the same labor market hired large numbers of teachers at a time in which the supply of teachers was relatively limited. As a result, they could not be selective in choosing among applicants. When enrollments were declining, personnel officers could be more selective and average teacher quality would rise.

This research was conducted using information on teachers and students from a large city in the Midwest. The information was very similar to that used in the New Haven research. The sample of students consisted of 325 Black children who were in the third or fourth grade in one of a number of inner-city schools.

This data base is particularly appropriate for the study of vintage effects because in the city that provided the data there have been large changes in public school enrollments over the last 30 years. During the 1940's, student enrollments were relatively stable at

approximately 20,000 students. Enrollments grew rapidly during the 1950's and more slowly during the 1960's, reaching a peak of 48,000 students in 1968. After 1968, enrollments decreased steadily, falling to 40,000 students in 1975, when the data were collected. As a result of these enrollment shifts, this city has experienced large changes in the number of teachers hired in different years and in the degree of selectivity that personnel officers could exercise in choosing among applicants. Consequently, there is a significant potential for vintage effects.

The results of the research indicate significant vintage effects. Teachers hired in periods of rapidly growing enrollments were less effective on average than teachers hired during periods of enrollment declines.

The vintage effects also influenced the research results concerning the relationship between teaching experience and teaching performance. When the effects of experience on performance were estimated without controlling for vintage effects, no significant relationship between teaching experience and teaching performance was found. However, when this relationship was reestimated, taking vintage effects into account, a significant positive relationship between teaching experience and teaching performance was found. The size of the estimated coefficient, translated into grade equivalents, implies that children taught by a teacher with five years of experience make three to four more months of progress in acquiring reading skills during a school year than do children taught by a first-year teacher.[3]

## Vintage effects in the future

If the type of vintage effects described here continues to hold in the future, teachers hired in the next few years should be of high average quality. The reason is that enrollments will continue to fall over the next five years and personnel officers will be able to select the few new teachers needed from a large pool of applicants. It is important to keep in mind, however, that the indicator of vintage effects used in this analysis provides information only about the demand for teachers; it contains no information about the supply of teachers.

[3]See Murnane and Phillips (1981) for a complete technical description of this research.

Recently, evidence has been presented (Weaver, 1978) indicating that the average quality of the students preparing to be teachers has fallen in recent years (as measured by SAT scores relative to the national mean). This decline is partly due to the response of college students to the labor market conditions for teachers and partly due to a lowering of standards by teacher training programs.

It is not clear to what extent the decline in the average quality of the applicant pool, if it is a significant drop, will affect the quality of the teachers who are actually hired. If teachers are chosen randomly from the applicant pool, the average quality of newly hired teachers will, of course, fall. However, if school districts fill their relatively few vacancies with the most able teachers in the large pool of applicants, the average quality need not fall and, in fact, may rise. This suggests that the process of selecting new teachers should be carried out with great care.

Teacher selection is especially important today because the turnover rate among teachers in most districts is so much lower than it was in the past. As a result, school districts have a high probability of experiencing for many years both the benefits of particularly able teachers and the costs of ineffective teachers. For these reasons, improving the process by which applicants for teaching positions are screened and new teachers chosen should have a high priority in the allocation of scarce school resources.

## Conclusion

In conclusion, I would like to return to the basic themes developed in this paper. The first and most important theme is that school experiences do influence the learning of inner-city children. Some inner-city children learn much more in school than other children do, and this is due, at least in part, to differences in the quality of education provided in different schools and in different classrooms within the same school. The second theme is that the quality of the teaching staff is one important determinant of the effectiveness of school programs. Consequently, it is important for school districts to evaluate the effectiveness of their personnel policies in attracting and retaining talented, dedicated teachers.

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